FLUID DIGEST

Research Update from the Fluid Fertilizer Foundation

Volume 5, Number 3 *September 1992*

Intensive Crop Management Pays Off in Wheat-Soybean Double-Crop System

Research in Maryland integrates various components including:

- Variety selection
- Nutrient management
- Weed control
- Disease and insect control
- Growth regulator use
- Use of tram lines for application and timing of the above treatments

In one study on wheat where 60 lb/a N was applied as 8-4-2 (N, P_2O_5, K_2O fluid) at greenup, the wheat produced 86.5 bu/a. But additional fertility treatments, plus a growth regulator (Cerone at 3/4 pt/a) and a fungicide (Punch at 4 oz/a) boosted yields to 104.4 bu/a—an increase of 17.9 bu/a. The wheat variety was Pioneer 2548, and the study was conducted on a Galestown sandy loam soil.

In a different nitrogen (UAN) rate study, pre-greenup applications (with and without DCD) on both sandy loam and silt loam soils produced similar wheat yields. The results for UAN-N are shown in Figure 1.

Eighty pounds of N increased the yield by 33.7 bu/a, and increased the net return by more than $81/a (at $0.25 N and $3 wheat). The net return per dollar invested in N was $4.05/a. Based on the response curve, rates of N greater than 80 pounds would have boosted profit even more. On average it took 2.37 pounds of applied N to produce another bushel of wheat.

Double crop, no-till soybeans (Pioneer 9461 and Union) were planted following wheat on two soil types. On the silt loam soil, beans planted on the untreated plots yielded 55.2 and 50.8 bu/a. Although the additional fertility treatment yields were not statistically different, 5 gal/a of Co Ron (28-0-0) applied at podding increased the yield of Pioneer 9461 by 6.1 bu/a. The Union variety was less responsive to nutrient treatments.

Project leader: F. Ronald Mulford
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For phosphate and potash double crop maintenance rates see Table 1, page 2.

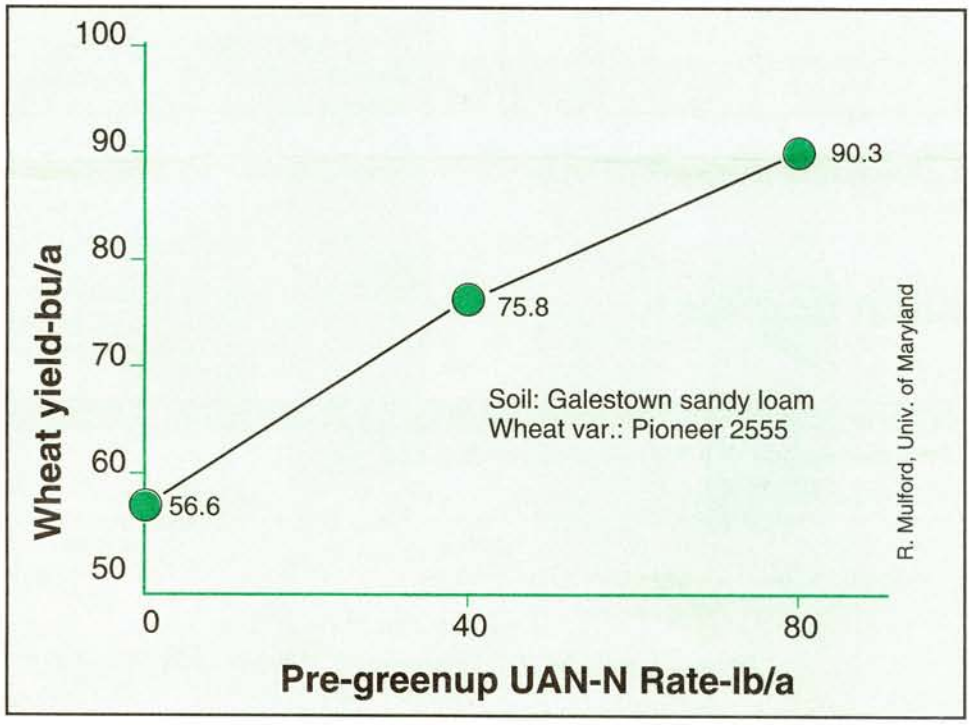

Figure 1. Effect of pre-greenup UAN-N rates on winter wheat yield (Maryland, 1991).

Select Wheat Variety to Get the Most Out of N

Non-project results from southern Illinois research conducted by Dr. Steve Ebelhar and R. Hines show how important wheat variety is in getting the best yield from no-till wheat with 40 lb of N applied at planting, followed by 40 lb of N March 1st. N rates greater than 80 lb did not increase yields. Yields of the three varieties in the study were:

Variety	Wheat yield-bu/a
Cardinal	27
Caldwell	34
Pioneer 2548	66

Phosphorus Boosts Sorghum Yield and N Recovery

Knifing 80 lb/a P_2O_5 (APP) with 80 lb N/a increased sorghum grain yields 40 bu/a in studies where the initial P soil test was low (4 ppm). On average it took 2 lb/a P_2O_5/bu of grain.

The phosphate treatment increased apparent N recovery by 37.4 percent and dramatically decreased the residual or carryover N left in the soil profile at the end of the season (Figure 2).

In this Greeley County study the phosphate helped the crop effectively use most of the 80 lb of applied N, protecting the environment and increasing profits.

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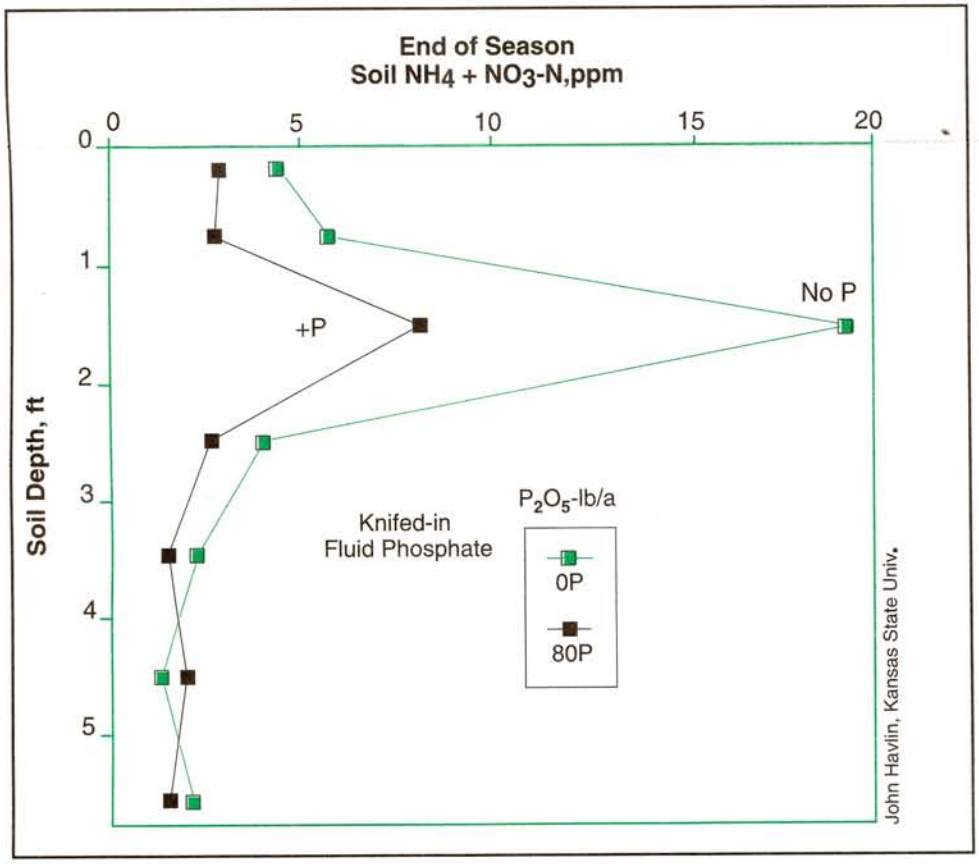

Figure 2. Knifed-in fluid phosphate decreased residual soil profile nitrogen (NH_4 + NO_3) following grain sorghum (Kansas, 1991).

Post-Planting Phosphate and Potash for Soybeans

In studies over a range of soil test P levels (4.7 to 13 ppm) and K test levels (55 to 68 ppm), methods and time of P or K application did not significantly increase soybean yields.

With increasing rates of phosphate (0 to 92 lb/a P_2O_5) yields at one site ranged from 48.3 to 47.1 bu/a, and from 28.1 to 30.2 bu/a at another.

It made little difference whether the applications were broadcast pre-plant or post-plant, or post-plant spoke-injected or knifed-in.

With potash, increasing rates (0 to 180 lb/a K_2O) at two sites produced yields ranging from 50.4 to 48.6 and 39.5 to 43.5 bu/a. The broadcast pre- or post-plant and spoke-injected and knifed-in post-plant yielded essentially the same.

The protein content of the soybeans was not influenced by the phosphate or potash rates or method and time of application. Depending on the location, the protein ranged from 38.1 to 42.7 percent.

In these studies, 10.2 lb/a P_2O_5 applied post-plant was needed to change the phosphorus soil test by 1 ppm or 2 lb/a. In the potash studies, it took 7.2 lb/a of post-plant K_2O to change the K test 1 ppm on one soil, but only 4.5 lb/a on the other.

Project leader: Dr. George Rehm
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Phosphorus and Potassium Soil Test

Optimum Bray P_1 phosphorus soil tests need to be in the 25 to 28 ppm (50 to 56 lb/a) range for wheat. For the Mehlich test, it should be greater than 30 ppm or 60 lb/a.

For soybeans, potassium levels are more important than phosphorus. Optimum soil test K levels should be greater than 151 ppm (302 lb/a). When the K test is in the 106 to 150 ppm range, 70 lb/a of K_2O is recommended when the yield potential is in the 50- to 60-bushel range.

Table 1.

Phosphate and Potash Maintenance Needs Increase with Wheat-Soybean Double Crop Yields

	50-bushel wheat			100-bushel wheat		
Bean yield—	30 bu	50 bu	60 bu	30 bu	50 bu	60 bu
	Maintenance P_2O_5-lb/a					
	71	87	96	116	128	136
	Maintenance K_2O-lb/a					
	54	80	93	69	95	108

Illinois Agronomy Handbook

High Soybean Yields in Project Experiments

Supplemental N for Soybeans-Wisconsin

Control plot yields at the Arlington and Hancock Stations using the Hardin variety in 11-inch rows yielded 70.8 and 71 bu/a, respectively. Hancock studies were irrigated. None of the responses to N source, method, time or rate of application was statistically significant.

However, one of the treatments was profitable. At the Hancock Station, when 50 lb/a of fluid N (25 lb pre-plant and 25 lb at the second leaf [V_2] stage) was applied with a spoke-injector, bean yields increased by 4 bu/a (a net return of $9.50/a).

Soybeans and Brown Stem Rot: Tillage, N Source and Rate, Variety, and Previous Crop-Wisconsin

Use of a brown stem rot resistant variety, such as BSR 101, is very important in no-till systems where the disease potential is high (Figure 3). BSR 101 yielded 9.1 bu/a more than Corsoy 79 in a no-till system, while in conventional-till the yields were essentially the same.

Fall-applied N (100 lb/a) resulted in less disease and higher yields for the "susceptible" Corsoy 79, but N applied in the spring after emergence had no effect on the disease or yield. The use of the "resistant" variety was more effective than N in overcoming the disease problem.

In a long-term rotation study (in its 9th year) comparing various cropping patterns (continuous corn, corn-soybeans, continuous soybeans) no-till soybeans yielded considerably less than soybeans in conventional tillage, especially when a brown stem rot susceptible variety was used (Corsoy 79). Corsoy 79 yielded 13.4 bu/a more in conventional-till, hitting 61.4 bu/a, while BRS 101 yielded 70.9 bu/a—7.1 bu/a greater than no-till yields!

In the overall study, 30 lb/a N applied to soybeans early in the growing season across tillage and rotation combinations increased the yield of Corsoy 79 by 3.4 bu/a. The N application gave a net return of $11.20/a with the brown stem rot susceptible variety.

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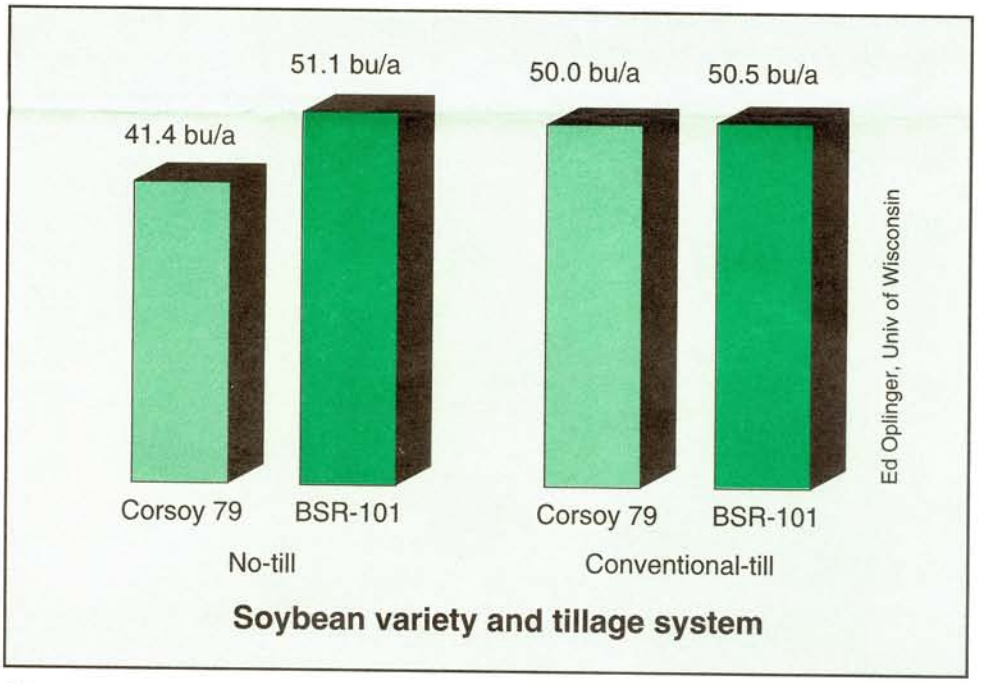

Figure 3. Use resistant varieties for higher soybean yields under no-till conditions where brown stem rot is a problem (Wisconsin, 1991)

News about Canola and Sulfur

When you measure soil nitrate-N, also check sulfate-S. Dr. Cynthia Grant, Agriculture Canada, reports that canola requires about 40 lb of S/a to produce a 1.34 ton crop—some three to ten times more S than a barley crop requires.

In some areas soil sulfate-sulfur (SO_4-S) is a good measure of available S. Research indicates response to applied sulfur can occur when SO_4-S is less than 18-27 lb/a in the top 2 ft of soil samples.

Using N:S ratios, leaf analysis indicates optimum canola yields are found with a ratio of 12:1.

Sulphur in Agriculture, Vol. 15, 1991

Water Availability Impacts Soybean Yields

Under high soil fertility levels, sub-irrigation with a 16-inch water table from mid-June to crop maturity, the yields of Resnik and Williams 82 beans were increased 55.3 and 50.7 bu/a, respectively, over non-irrigated yields.

Fifty pounds of N applied at the R_2 (flowering) and R_4 (pods 3/4-inch) with sub-irrigation increased Resnik yield by 7.1 bu/a and Williams 82 yield by 6.8 bu/a. The net return for the fluid N would be $14.05/a for the Resnik and $12.40/a for Williams 82, using $5.50-beans and $.25-N.

Project leader: Dr. Richard Cooper, USDA, ARS and Ohio State University
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News about Sulfur for Wheat-Kansas

Dr. Ray Lamond reports that growers on sandy soils should strongly consider applying 15-20 lb of S per acre. Results have been inconsistent on fine-textured soils.

Both surface band and broadcast application are effective when top dressed in the fall or late winter. Ammonium sulfate and ammonium thiosulfate (ATS) are effective.

Sulphur in Agriculture, Vol. 15, 1991

Foundation News

By Dr. Robert D. Munson
Vice President
Research, Education and
Market Development

New officers for 1992-1993 elected at the July 12th FFF Board meeting in Memphis, Tenn. include Ed Krysl, Kerley Ag, Inc., President; Dixon Abell, Ouachita Fertilizer Company, Vice President; and Paul Bodenstine, Alliance Agronomics Inc., Secretary/Treasurer.

Action was also taken at that time to initiate modification of the Foundation Bylaws and operation. Krysl appointed a Bylaws Revision and Feasibility Committee to firm up the Bylaws changes needed by the Foundation, and develop plans. Krysl and the Committee will meet in St. Louis mid-September to chart the future of the Foundation.

Research Project Update Reports indicate that research studies are coming along well. After late season frosts, results from Wisconsin indicate K helped overcome soil compaction on first-cut alfalfa. The North Carolina corn-ICM studies on environmentally sensitive soils were looking good. The Ohio pre-sidedress N soil test-N-corn studies are late because of lower than normal temperatures and early drought-stress, but are now growing fine after 10 inches of rain during July. The hybrid-population-N rate studies are not suffering due to a lack of moisture this year.

The devices developed in Pennsylvania to measure N loss from N treatments in the field are apparently working well. Lack of soil moisture is not a problem this year in the Kansas studies, and they have the potential for some of their highest yields in years. The Colorado dryland cropping systems studies were short of moisture early, but should be coming along well with the subsequent rains. Early reports on the cotton over the row and in-furrow treatments indicate that there should be positive response again this season. Corn planted into different levels of wheat residues in no-till with different fertility (row) treatments looked good in southern Illinois, as did the wheat-sulfur-soybean plots observed.

Overall, this should be a good year in spite of the El Nino. Remember, that every year an El Nino occurs, yields in the Midwest are at or above the trend line. Subsoils are certainly recharged.

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